

The melting mountain and shifting systems: Scenario analyses and visualization tools for understanding climate change impact on the Himalayan Region

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Introduction

The Himalaya is the youngest and highest mountain system in the world, endowed with rich and diverse life forms. It is recognized as a global biodiversity hotspot and influences the climate of the Indian subcontinent. The effects of climate change are pronounced in places such as the Himalaya, where the network of snow-clad mountains, ice-peaks, high intensity drainage and precipitation characterizes the bio-social landscape. Robust projections of future climate changes through validated models incorporating both climatic and anthropogenic drivers are necessary for plausible understanding and effective adaptation/mitigation strategies. Visualization tools will facilitate stakeholder engagement and policy formulations necessary for managing climate vulnerable systems and species.



National Mission for Sustaining the Himalayan Eco-system (NMSHE)

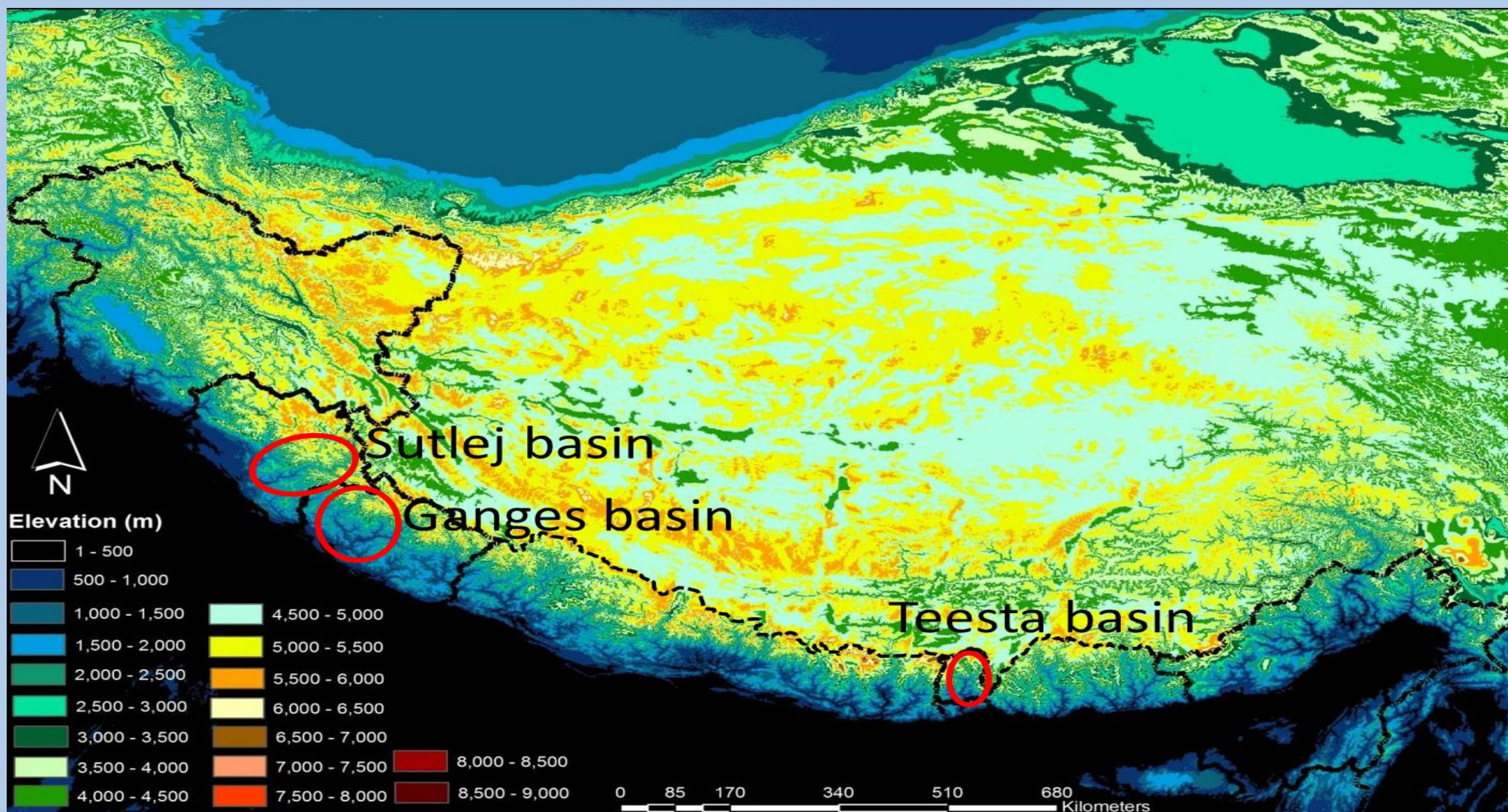
Realizing the need for developing science based action plans to address both the existing as well as emerging threats of climate change in the fragile mountain ecosystems of the IHR, the National Mission for Sustaining the Himalayan Ecosystem (NMSHE) has been conceived as part of the National Action Plan on Climate Change (NAPCC) under the coordination of the Department of Science & Technology (DST) and is expected to offer practical adaptation strategies.

Objectives

- ❖ To undertake climate change scenario analyses for predicting potential effects on fauna and their habitats.
- ❖ To develop visualization tool as a strategy to communicate with stakeholders and to influence policy and decision making.

Study Area

The Himalayan region from Jammu & Kashmir through Uttarakhand, Nepal, Bhutan and Arunachal Pradesh. However, intensive focus will be done in the Ganges and Teesta catchments, which represent the habitat and elevation ranges of the Himalaya.

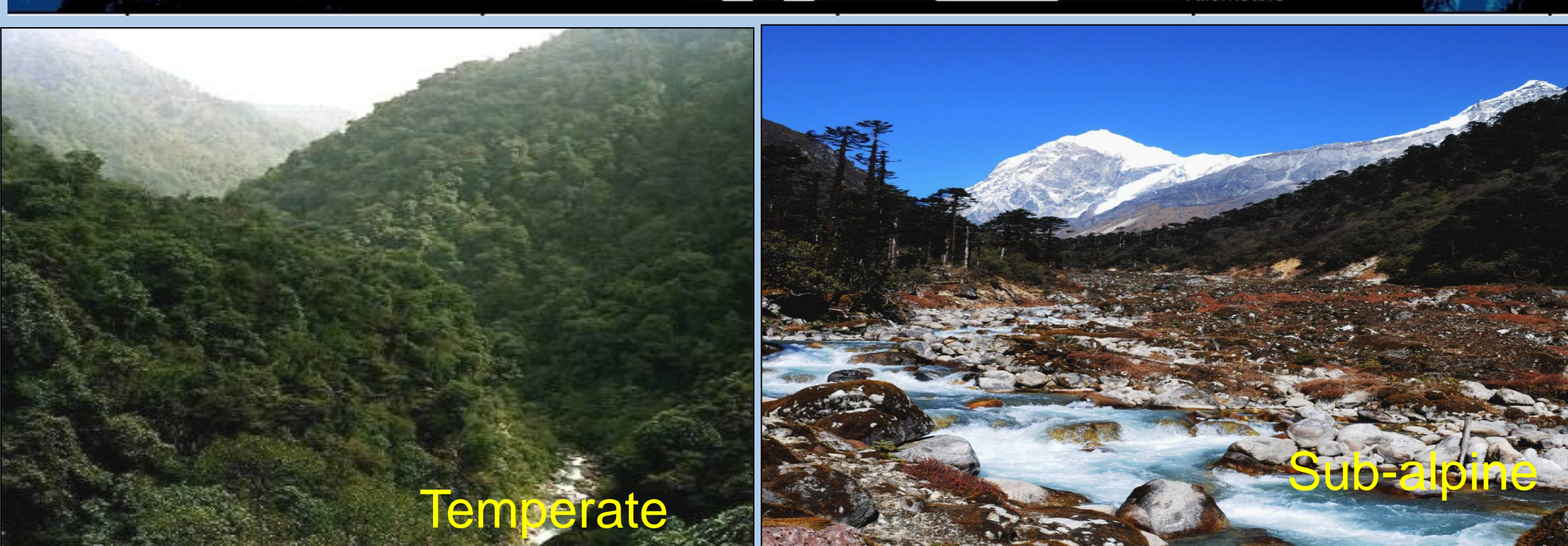


Himalayan Context

- ❖ Over 40 climate models exist for the globe.
- ❖ Regional climate models – PRECIS projections indicate there will be 0.5-5 °C warming over Hindu Kush Himalayan region and 20-40% higher summer monsoon precipitation by 2080s.¹
- ❖ An analysis of 19 ESMs (CMIP5) models over Kailash Sacred landscape concluded large and substantial shifts in bioclimatic zones (55%) and eco-regions (36.6%) by 2050s.²

Target Groups

1. Mammals
2. Birds
3. Fishes
4. Insects
5. Micro-flora & fauna
6. Local people

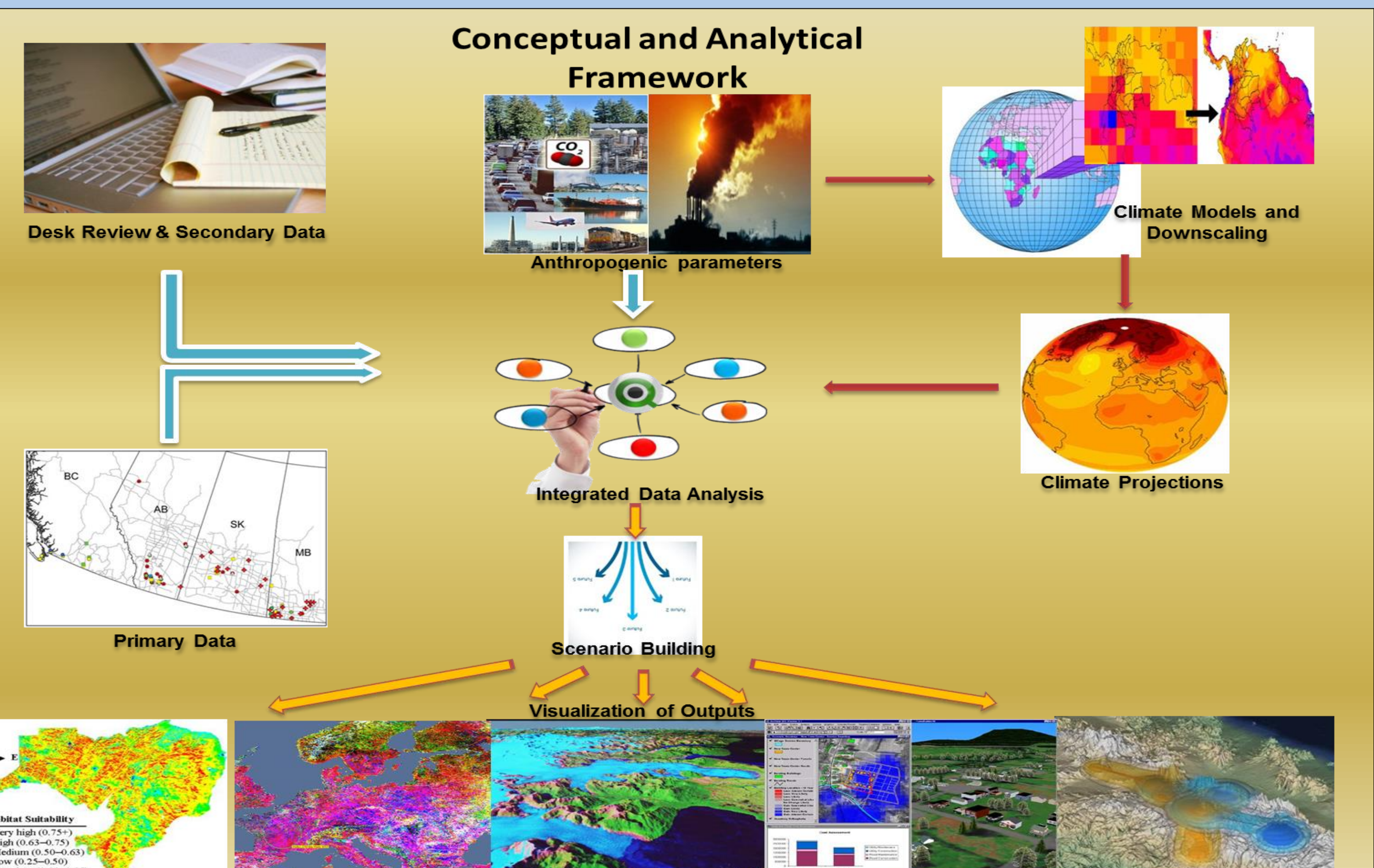


Methodology:

- ❖ The over-arching strategy would be hierarchical approach taking into consideration appropriate ecological (e.g. watershed/climatic zone) and spatial units (e.g. grid cells) for various eco-region and taxa.
- ❖ It is proposed to statistically downscale the regional climate projections by using the best statistical downscaling techniques.
- ❖ Integrate GIS technology, 2-D mapping, and numerical/graphical-analysis capabilities with robust 3-D visualization technology.

Expected Outcomes

- ❖ In this project we aim to address the multi-taxa and ecosystems to identify the vulnerable sites and species that are likely to be affected by climate change effects.
- ❖ Scenarios analysis and visualization tools would thus be helpful to making science-based decisions to address climate related issues in the Indian Himalayan Region and would provide strong support for national policy making and global negotiations.



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Key References:

¹Kulkarni *et al* 2013. Projected Climate Change in the Hindu Kush–Himalayan Region By Using the High-resolution Regional Climate Model PRECIS. *Mountain Research and Development*, **33**(2): 142-151

²Zomer *et al* 2014. Projected climate change impacts on spatial distribution of bioclimatic zones and eco-regions within the Kailash Sacred Landscape of China, India, Nepal. *Climate Change*, **125**(3-4): 445-460